WHAT IS CLAIMED IS:

1. A substrate bonding apparatus used in fabricating LCD devices, comprising:

a base frame;

an upper chamber unit;

a lower chamber unit mounted to the base frame, wherein the lower chamber unit is selectively connectable with the upper chamber unit;

chamber moving means for raising and lowering the upper chamber unit;

an upper stage mounted to the upper chamber unit;

a lower stage mounted to the lower chamber unit;

sealing means provided to a surface of one of the upper or lower chamber units;

first alignment means for leveling the upper stage with respect to the lower stage; and

second alignment means for horizontally aligning the upper stage with respect to the lower stage.

2. The substrate bonding apparatus of claim 1, wherein the sealing means seals an interior space from an external environment, wherein the interior space is definable by connected ones of the upper and lower chamber units.

3. The substrate bonding apparatus of claim 2, wherein

the upper and lower stages are arrangeable within the interior space; and

the sealing means includes a central sealing member, wherein the central sealing member defines the lateral boundary of the interior space.

4. The substrate bonding apparatus of claim 3, wherein the central sealing member includes an elastic material.

5. The substrate bonding apparatus of claim 3, wherein the first seal member includes an O-ring.

6. The substrate bonding apparatus of claim 1, wherein the first alignment means includes:

at least one first actuator fixed to the upper chamber unit;

at least one first shaft fixed to a respective first actuator, wherein an end portion of the first shaft is moveable with respect to the upper chamber unit; and

sensing means for sensing a contact between each first shaft and the lower chamber unit.

7. The substrate bonding apparatus of claim 6, wherein the sensing means includes a load cell provided in each first actuator.

8. The substrate bonding apparatus of claim 6, wherein the sensing means includes a load cell provided in an upper surface of the lower chamber unit.

9. The substrate bonding apparatus of claim 8, wherein the load cell is contactable by a respective first actuator.

10. The substrate bonding apparatus of claim 6, wherein the sensing means includes a gap sensor for measuring a gap between the lower chamber unit and the end portion of the first shaft.

11. The substrate bonding apparatus of claim 6, further comprising a plurality of first actuators arranged at corners of the upper chamber unit.

12. The substrate bonding apparatus of claim 6, further comprising at least one receiving groove arranged within an upper surface of the lower chamber unit for receiving a respective first shaft.

13. The substrate bonding apparatus of claim 12, wherein dimensions of the receiving groove conform substantially to dimensions of the end portion of the first shaft.

14. The substrate bonding apparatus of claim 13, wherein the end portion of the first shaft includes a conical tapered structure.

15. The substrate bonding apparatus of claim 1, wherein the upper chamber unit comprises:

an upper base movably coupled to the base frame; and

an upper chamber plate immovably coupled to a bottom peripheral surface of the upper base.

16. The substrate bonding apparatus of claim 15, wherein

the upper chamber plate defines an upper space; and

the upper stage is connected to the upper base within the upper space.

17. The substrate bonding apparatus of claim 1, wherein the lower chamber unit comprises:

a lower base immovably coupled to the base frame; and

a lower chamber plate movably arranged over an upper surface of the lower base.

18. The substrate bonding apparatus of claim 17, wherein the lower chamber plate is horizontally moveable with respect to the lower base.

19. The substrate bonding apparatus of claim 17, wherein

the lower chamber plate defines a lower space; and

the lower stage is connected to the lower base within the lower space.

20. The substrate bonding apparatus of claim 1, wherein the second alignment means includes:

at least one alignment camera;

a plurality of cams, wherein each cam is rotatably contactable to a portion of the lower chamber unit; and

a plurality of restoring means connected between the lower base and the lower chamber unit.

21. The substrate bonding apparatus of claim 20, wherein the restoring means includes a coil spring.

22. The substrate bonding apparatus of claim 1, further comprising at least one first interval control groove arranged within a surface of the other of the upper and lower chamber units to which the sealing means is provided for receiving the sealing means.

23. The substrate bonding apparatus of claim 22, wherein a depth of the first interval control groove within the other of the upper and lower chamber units to which the sealing means is provided varies in accordance with the distance of the first interval control groove from the center of the other of the upper and lower chamber units to which the sealing means is provided.

24. The substrate bonding apparatus of claim 22, wherein the sealing means includes a central sealing member having a predetermined thickness corresponding to a depth of the first interval control groove within the other of the upper and lower chamber units to which the sealing means is provided.

25. The substrate bonding apparatus of claim 24, wherein the central sealing member includes an elastic material.

26. The substrate bonding apparatus of claim 24, wherein the first seal member includes an O-ring.

27. The substrate bonding apparatus of claim 24, further comprising an auxiliary sealing member arranged within one of the upper and lower chamber units.

28. The substrate bonding apparatus of claim 27, wherein the auxiliary sealing member is spaced apart from the central sealing member by a predetermined distance.

29. The substrate bonding apparatus of claim 18, further comprising:

a second interval control groove arranged within a surface of the other of the upper and lower chamber units to which the auxiliary sealing member is provided.

30. The substrate bonding apparatus of claim 29, wherein

the first interval control groove has a first depth within the other of the upper and lower chamber units to which the sealing means is provided; and

the second interval control groove has a second depth within the other of the upper and lower chamber units to which the auxiliary sealing member is provided, wherein the first depth is different from the second depth.

31. The substrate bonding apparatus of claim 1, wherein the chamber moving means includes:

a driving motor fixed to the base frame;

a driving shaft coupled to the driving motor;

a connecting part connected to the driving shaft;

a jack part connected to the upper chamber unit; and

a connecting shaft including a first end connected to the jack part and a second end connected to receive a driving force translated by the connecting part.

32. The substrate bonding apparatus of claim 1, further comprising interval control means fixed to one of the upper and lower chamber units for pushing against the other of the upper and lower chamber units to which the interval control means is fixed.

33. The substrate bonding apparatus of claim 32, wherein the interval control means includes:

at least one moving part fixed to the upper chamber unit; and

at least one second shaft coupled to the moving part, wherein the second shaft is movable with respect to the upper chamber unit for pushing against the lower chamber unit.

34. The substrate bonding apparatus of claim 33, wherein at least one moving part includes a linear actuator.

35. The substrate bonding apparatus of claim 33, wherein at least one moving part includes a step motor.

36. The substrate bonding apparatus of claim 33, wherein at least one moving part includes a linear motor.

37. The substrate bonding apparatus of claim 33, further comprising an interval sealing member arranged on the surface of the lower chamber unit, wherein the interval sealing member is contactable by the second shaft.

38. The substrate bonding apparatus of claim 37, wherein the interval sealing member is arranged within the surface of the lower chamber unit.

39. The substrate bonding apparatus of claim 1, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

40. The substrate bonding apparatus of claim 39, wherein the upper stage includes:

a plurality of vacuum holes, wherein a suction force is transmittable by the plurality of vacuum holes; and

a plurality of electrostatic chucks, wherein an electrostatic charge is generatable by the plurality of electrostatic chucks.

41. The substrate bonding apparatus of claim 40, wherein the at least one guiding groove does not comprise the vacuum holes.

42. The substrate bonding apparatus of claim 40, wherein the at least one guiding groove does not comprise the electrostatic chucks.

43. The substrate bonding apparatus of claim 1, further comprising:

at least one passage arranged within the upper stage and intersecting a lower surface of the upper stage; and

a suction force transmitter arranged within each passage, the suction force transmitter including a transmission source that is projectable from within the passage to a predetermined distance from the lower surface of the upper stage, wherein a suction force is transmittable the predetermined distance from the lower surface of the upper stage.

44. The substrate bonding apparatus of claim 43, wherein

the transmission source includes a pad having at least one through-hole, wherein a suction force is transmittable by the at least one through-hole; and

the suction force transmitter further includes:

a vacuum pump generating the suction force;

a pipeline in fluid communication with the at least one through-hole and the vacuum pump, wherein the pipeline is moveable within the passage; and

a driving part for moving the pipeline within the passage.

45. The substrate bonding apparatus of claim 44, wherein

the driving part comprises an actuator; and

the pipeline is an axis of the actuator.

46. The substrate bonding apparatus of claim 44, wherein

the driving part comprises a step motor; and

the pipeline is an axis of the step motor.

47. The substrate bonding apparatus of claim 43, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

48. A method of leveling stages within a substrate bonding apparatus, comprising:

driving a plurality of actuators to lower a corresponding plurality of first shafts;

contacting the lowered plurality of first shafts to an upper surface of a lower chamber plate;

detecting whether one of the lowered plurality of first shafts contacts the upper surface of the lower chamber plate before others of the lowered plurality of first shafts contacts the upper surface of the lower chamber plate; and

compensating the distance to which others of the plurality of first shafts are lowered based on the detecting.

49. The aligning method of claim 48, wherein the driving comprises driving the plurality of actuators until respective ones of the first shafts contact the upper surface of the lower chamber plate.

50. The aligning method of claim 48, further comprising lowering the plurality of actuators until at least one of the first shafts contact the upper surface of the lower chamber plate.

51. The aligning method of claim 48, wherein the compensating comprises lowering the others of the plurality of first shafts to contact the upper surface of the lower chamber plate.

52. A substrate bonding apparatus for fabricating a liquid crystal display (LCD) device comprising:

a base frame;

an upper chamber unit, wherein the upper chamber unit includes an upper base and an upper chamber plate;

a lower chamber unit mounted to the base frame, wherein the lower chamber unit includes a lower base and a lower chamber plate, and wherein the lower chamber unit is selectively connectable with the upper chamber unit;

an upper stage mounted to the upper base;

a lower stage mounted to the lower base;

at least one first interval control groove arranged within a surface of one of the upper and lower chamber plates;

sealing means arranged within a surface of the other of the upper and lower chamber plates within which the at least one control groove is arranged; and

plate moving means for horizontally moving at least one chamber plate.

53. The substrate bonding apparatus of claim 52, wherein

the upper base is movably coupled to the base frame; and

the upper chamber plate is immovably coupled to a bottom peripheral surface of the upper base.

54. The substrate bonding apparatus of claim 52, wherein

the lower base is immovably coupled to the base frame; and

the lower chamber plate is movably arranged over an upper surface of the lower base.

55. The substrate bonding apparatus of claim 54, wherein the lower chamber plate is horizontally moveable with respect to the lower base.

56. The substrate bonding apparatus of claim 52, wherein the sealing means includes a central sealing member, wherein the central sealing member defines the lateral boundary of the interior space, and wherein the central sealing member is arranged opposite the first interval control groove.

57. The substrate bonding apparatus of claim 56, wherein

the first interval control groove is arranged within a lower surface of the upper chamber plate; and

the central sealing member is arranged within an upper surface of the lower chamber plate.

58. The substrate bonding apparatus of claim 56, further comprising a second interval control groove arranged within the surface of the one of the upper and lower chamber plates.

59. The substrate bonding apparatus of claim 58, further comprising an auxiliary sealing member arranged on the surface of the other of the upper and lower chamber plates.

60. The substrate bonding apparatus of claim 59, wherein the auxiliary sealing member is arranged opposite the second interval control groove.

61. The substrate bonding apparatus of claim 59, wherein

the first interval control groove has a first depth within the one of the upper and lower chamber units; and

the second interval control groove has a second depth within the one of the upper and lower chamber units, wherein the first depth is different from the second depth.

62. The substrate bonding apparatus of claim 59, wherein the first interval control groove is spaced apart from the second interval control groove by a predetermined distance.

63. The substrate bonding apparatus of claim 56, wherein a depth of the first interval control groove within the one of the upper and lower chamber plates varies in accordance with the distance of the first interval control groove from the center of the one of the upper and lower chamber plates.

64. The substrate bonding apparatus of claim 56, wherein the plate moving means is arranged operably proximate the lower chamber unit for horizontally moving the lower chamber plate.

65. The substrate bonding apparatus of claim 64, wherein the plate moving means includes:

a cam motor fixed to the base frame; and

a cam having eccentrically connect to the cam motor, wherein the cam is rotatably contactable to the lower chamber plate.

66. The substrate bonding apparatus of claim 56, further comprising interval control means fixed to one of the upper and lower chamber units for pushing against the other of the upper and lower chamber units on which the interval control means is fixed.

67. The substrate bonding apparatus of claim 66, wherein the interval control means is fixed to the upper chamber unit.

68. The substrate bonding apparatus of claim 67, wherein the interval control means includes:

at least one moving part fixed to the upper chamber unit; and

at least one second shaft coupled to the moving part, wherein the second shaft is movable with respect to the upper chamber unit for pushing against the lower chamber unit.

69. The substrate bonding apparatus of claim 68, wherein at least one second shaft is movable through the upper chamber plate.

70. The substrate bonding apparatus of claim 68, wherein at least one moving part includes a linear actuator.

71. The substrate bonding apparatus of claim 68, wherein at least one moving part includes a step motor.

72. The substrate bonding apparatus of claim 68, wherein at least one moving part includes a linear motor.

73. The substrate bonding apparatus of claim 68, further comprising an interval sealing member arranged on the surface of the lower chamber plate, wherein the interval sealing member is contactable by the second shaft.

74. The substrate bonding apparatus of claim 73, wherein the interval sealing member is arranged within the surface of the lower chamber plate.

75. The substrate bonding apparatus of claim 56, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

76. The substrate bonding apparatus of claim 75, wherein the upper stage includes:

a plurality of vacuum holes, wherein a suction force is transmittable by the plurality of vacuum holes; and

a plurality of electrostatic chucks, wherein an electrostatic charge is generatable by the plurality of electrostatic chucks.

77. The substrate bonding apparatus of claim 76, wherein the at least one guiding groove does not comprise the vacuum holes.

78. The substrate bonding apparatus of claim 76, wherein the at least one guiding groove does not comprise the electrostatic chucks.

79. The substrate bonding apparatus of claim 56, further comprising:

at least one passage arranged within the upper stage and intersecting a lower surface of the upper stage; and

a suction force transmitter arranged within each passage, the suction force transmitter including a transmission source that is projectable from within the passage to a predetermined distance from the lower surface of the upper stage, wherein a suction force is transmittable the predetermined distance from the lower surface of the upper stage.

80. The substrate bonding apparatus of claim 79, wherein

the transmission source includes a pad having at least one through-hole, wherein a suction force is transmittable by the at least one through-hole; and

the suction force transmitter further includes:

a vacuum pump generating the suction force;

a pipeline in fluid communication with the at least one through-hole and the vacuum pump, wherein the pipeline is moveable within the passage; and

a driving part for moving the pipeline within the passage.

81. The substrate bonding apparatus of claim 80, wherein

the driving part comprises an actuator; and

the pipeline is an axis of the actuator.

82. The substrate bonding apparatus of claim 80, wherein

the driving part comprises an step motor; and

the pipeline is an axis of the step motor.

83. The substrate bonding apparatus of claim 79, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

84. A method of fabricating a liquid crystal display (LCD) device using a substrate bonding apparatus, comprising:

determining a thickness of first and second substrates;

based on the determined thickness, determining a horizontal distance to move a lower chamber plate of the substrate bonding apparatus;

moving the lower chamber plate the determined horizontal distance;

loading the first and second substrates into the substrate bonding apparatus; and

bonding the loaded first and second substrates.

85. The method of claim 84, wherein the determined horizontal distance corresponds to a distance between a first portion of an upper chamber plate oppositely arranged a sealing member arranged on the lower chamber plate and a grooved portion of the upper chamber plate.

86. A substrate bonding apparatus for fabricating an LCD device comprising:

a base frame;

an upper chamber unit;

a lower chamber unit mounted to the base frame, wherein the lower chamber unit is selectively connectable with the upper chamber unit;

chamber moving means for raising and lowering the upper chamber unit;

an upper stage mounted to the upper chamber unit;

a lower stage mounted to the lower chamber unit;

first alignment means for leveling the upper stage with respect to the lower stage;

interval control means fixed to one of the upper and lower chamber units for pushing against the other of the upper and lower chamber units on which the interval control means is fixed; and

sealing means provided to a surface of one of the upper and lower chamber units.

87. The substrate bonding apparatus of claim 86, wherein

the upper chamber unit comprises:

an upper base; and

an upper chamber plate coupled to the upper base; and

wherein the lower chamber unit comprises:

a lower base; and

a lower chamber plate arranged over the lower base.

88. The substrate bonding apparatus of claim 87, wherein the interval control means is fixed to the upper base.

89. The substrate bonding apparatus of claim 88, wherein the interval control means includes:

at least one moving part fixed to the upper base; and

at least one second shaft coupled to the moving part, wherein the second shaft is movable with respect to the upper chamber unit for pushing against the lower chamber plate.

90. The substrate bonding apparatus of claim 88, wherein at least one second shaft is movable through the upper chamber plate.

91. The substrate bonding apparatus of claim 90, wherein at least one moving part includes a linear actuator.

92. The substrate bonding apparatus of claim 90, wherein at least one moving part includes a step motor.

93. The substrate bonding apparatus of claim 90, wherein at least one moving part includes a linear motor.

94. The substrate bonding apparatus of claim 90, further comprising an interval sealing member arranged on the surface of the lower chamber plate, wherein the interval sealing member is contactable by the second shaft.

95. The substrate bonding apparatus of claim 94, wherein the interval sealing member is arranged within the surface of the lower chamber plate.

96. The substrate bonding apparatus of claim 86, wherein the first alignment means includes:

at least one receiving groove arranged within an upper surface of the lower chamber unit, wherein a center portion of each receiving groove is deeper within the lower chamber unit than peripheral portions of the receiving groove;

at least one linear actuator; and

at least one first shaft fixed to a respective linear actuator, wherein an end portion of the first shaft is movable with respect to the upper chamber unit, wherein the end portion of the first shaft is receivable within a corresponding receiving groove, and wherein dimensions of the end portion of the first shaft substantially conform to dimensions of the at least one receiving groove.

97. The substrate bonding apparatus of claim 86, wherein the chamber moving means includes:

a driving motor fixed to the base frame;

a driving shaft coupled to the driving motor;

a connecting part connected to the driving shaft;

a jack part connected to the upper chamber unit; and

a connecting shaft including a first end connected to the jack part and a second end connected to receive a driving force translated by the connecting part.

98. The substrate bonding apparatus of claim 86, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

99. The substrate bonding apparatus of claim 86, wherein the upper stage includes:

a plurality of vacuum holes, wherein a suction force is transmittable by the plurality of vacuum holes; and

a plurality of electrostatic chucks, wherein an electrostatic charge is generatable by the plurality of electrostatic chucks.

100. The substrate bonding apparatus of claim 99, wherein the at least one guiding groove does not comprise the vacuum holes.

101. The substrate bonding apparatus of claim 99, wherein the at least one guiding groove does not comprise the electrostatic chucks.

102. The substrate bonding apparatus of claim 86, further comprising:

at least one passage arranged within the upper stage and intersecting a lower surface of the upper stage; and

a suction force transmitter arranged within each passage, the suction force transmitter including a transmission source that is projectable from within the passage to a predetermined distance from the lower surface of the upper stage, wherein a suction force is transmittable the predetermined distance from the lower surface of the upper stage.

103. The substrate bonding apparatus of claim 102, wherein

the transmission source includes a pad having at least one through-hole, wherein a suction force is transmittable by the at least one through-hole; and

the suction force transmitter further includes:

a vacuum pump generating the suction force;

a pipeline in fluid communication with the at least one through-hole and the vacuum pump, wherein the pipeline is moveable within the passage; and

a driving part for moving the pipeline within the passage.

104. The substrate bonding apparatus of claim 103, wherein

the driving part comprises an actuator; and

the pipeline is an axis of the actuator.

105. The substrate bonding apparatus of claim 103, wherein

the driving part comprises a step motor; and

the pipeline is an axis of the step motor.

106. The substrate bonding apparatus of claim 102, further comprising at least one guiding groove arranged within a lower surface of the upper stage, wherein fingers of a substrate loader are receivable within a respective guiding groove.

107. A method of fabricating a liquid crystal display (LCD) device using a substrate bonding apparatus, comprising:

determining a thickness of first and second substrates;

based on the determined thickness, determining a vertical distance to move a shaft of an interval control means relative to a chamber unit of the substrate bonding apparatus;

driving the interval control means to move the shaft the predetermined vertical distance;

loading the first and second substrates into the substrate bonding apparatus; and

bonding the loaded first and second substrates.

108. A substrate bonding apparatus for fabricating a liquid crystal display (LCD) device, comprising:

an upper stage including a lower surface and at least one guiding groove within the lower surface, wherein fingers of a substrate loader are receivable within a respective guiding groove; and

a lower stage arranged opposite the upper stage.

109. The substrate bonding apparatus of claim 108, wherein the upper stage includes:

a plurality of vacuum holes, wherein a suction force is transmittable by the plurality of vacuum holes; and

a plurality of electrostatic chucks, wherein an electrostatic charge is generatable by the plurality of electrostatic chucks.

110. The substrate bonding apparatus of claim 109, wherein the at least one guiding groove does not comprise the vacuum holes.

111. The substrate bonding apparatus of claim 109, wherein the at least one guiding groove does not comprise the electrostatic chucks.

112. A fabricating apparatus for a liquid crystal display (LCD) device, comprising:

a substrate loader including at least one finger, wherein an upper surface of a first substrate is fixable to the at least one finger;

an upper stage including a lower surface and at least one guiding groove within the lower surface, wherein fingers of the substrate loader are receivable within a respective guiding groove, wherein the upper surface of the first substrate is contactable to the lower surface of the upper stage; and

a lower stage arranged opposite the upper stage.

113. The fabricating apparatus for the LCD device of claim 112, wherein at least one finger comprises:

a vacuum pipeline; and

at least one first through-hole in fluid communication with the vacuum pipeline, wherein a suction force is transmittable by the at least one first through-hole to the upper surface of the first substrate.

114. A fabricating apparatus for a liquid crystal display (LCD) device, comprising:

an upper stage including a lower surface;

at least one passage arranged within the upper stage and intersecting the lower surface of the upper stage;

a suction force transmitter arranged within each passage, the suction force transmitter having an transmission source that is projectable from within the passage to a predetermined distance from the lower surface, wherein a suction force is transmittable the predetermined distance from the lower surface of the upper stage; and

a substrate loader including at least one finger, wherein the upper surface of the substrate is fixable to the at least one finger.

115. The fabricating apparatus for the LCD device of claim 114, wherein

the transmission source includes a pad having at least one through-hole, wherein a suction force is transmittable by the at least one through-hole; and

the suction force transmitter further includes:

a vacuum pump generating the suction force;

a pipeline in fluid communication with the at least one through-hole and the vacuum pump, wherein the pipeline is moveable within the passage; and

a driving part for moving the pipeline within the passage.

116. The fabricating apparatus for the LCD device of claim 115, wherein

the driving part comprises an actuator; and

the pipeline is an axis of the actuator.

117. The fabricating apparatus of claim 115, wherein

the driving part comprises a step motor; and

the pipeline is an axis of the step motor.

118. A method of loading substrates into a substrate bonding apparatus used in fabricating liquid crystal display (LCD) devices, comprising:

transmitting a first suction force from a lower surface of a substrate loader to an upper surface of a substrate;

arranging the substrate loader below a lower surface of a stage;

transmitting a second suction force to the upper surface of the substrate, wherein a transmission source of the second suction force is spaced apart from the lower surface of the stage by a predetermined distance;

releasing the first suction force between the lower surface of the substrate loader and the upper surface of the substrate;

raising the transmission source of the second suction force; and

contacting the upper surface of the substrate to the lower surface of the stage.